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Residential, Commercial, and Industrial Sector GHG Reduction Policy Options

TWG Meeting #6, December 1, 2005

Potential Emission Reductions *	Potential Cost or Cost Savings *
High (H): At least 1 Million Metric Tons (MMT) carbon dioxide equivalent (CO_2e) per year by 2020 (~1% of current NM emissions)	**High (H)**: $50 per Metric Ton CO_2e ($MTCO_2e$) or above
Medium (M): From 0.1 to 1 MMT CO_2e per year by 2020	**Medium (M):** $5-50/$MTCO_2e$
Low (L): Less than 0.1 MMT CO_2e per year by 2020	**Low (L):** Less than $5/$MTCO_2e$
Uncertain (U): Not able to estimate at this time	**Cost Savings**: Options that save money, i.e., that have "negative costs."
	Uncertain (U): Not able to estimate at this time

***** "Potential" here connotes rough initial estimate based in part on experience in other states. Also, several measures may overlap in terms of emissions reductions and/or cost impacts. Estimates assume measures would be implemented independently from other measures.

Definition of Priorities for Analysis:

- **High:** High priority options will be analyzed first.
- **Medium:** Medium priority options will be analyzed next, time and resources permitting.
- **Low**: Low priority options will be analyzed last, time and resources permitting.
- **"TBD"**: Still to be determined by the TWG

**** Options marked with a double asterisk (**) indicate options that are at least partially "base case" policies, i.e., that have been or will be implemented at some level in Arizona. Please see http://www.azclimatechange.us/ewebeditpro/items/O40F6847.pdf for an initial, non-comprehensive sampling of such policies as they relate to the policy option categories listed below.**

Comments or priorities highlighted in yellow were noted or confirmed during the Arizona Climate Change Advisory Group (AG) Meeting on September 29, 2005. Text in blue refers to changes added from Call #5.

Option No.	GHG Reduction Policy Option	Priority for Analysis	Potential GHG Emissions Reductions	Potential Cost or Cost Savings	Ancillary Impacts, Feasibility Considerations	Notes
1.	**Energy Efficiency Programs, Funds, and Goals**					
1.1	Demand Side Management (DSM) Programs for Electricity, Natural Gas, Propane, Fuel Oil, and Energy Efficiency Funds (e.g. Public Benefit Funds) **	High	High	Cost Savings/ Low Cost	Co-benefits include transmission/distribution system costs reduction. Significant potential overlap with many other options.	DSM programs and/or Energy Efficiency Funds could be administered by utilities, State agencies, and/or 3rd parties (e.g. "Energy Trusts")
1.2	Energy Efficiency Requirements (e.g. Utility Savings Goals or Energy Portfolio Standards)	High	High	Cost Savings/ Low Cost	[As above]	
1.3	State Energy Savings Goals (and Green Procurement Strategies)	High?	TBD	Cost Savings/ Low Cost	[As above]	Goals for savings in energy use by State agencies and in State Government (and government-funded?) buildings
1.4	Promotion and Tax or Other State Incentives for EnergyStar and better appliances and equipment**	Medium/ High (AG ranked High)	High	Cost Savings/ Low Cost	Interaction with appliance standards, utility programs.	
1.5	Market Transformation and Technology development programs**	High	High	Cost Savings/ Low Cost		

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2.	**Appliance Standards**					
2.1	Expansion of State-level Appliance Efficiency Standards**	High	Low-High	Cost Savings/ Low Cost	Feasibility enhanced by ongoing effort to adopt California standards	Likely to include both State-level standards and support for Federal-level appliance efficiency standards for appliances where the latter are considered sufficiently stringent.

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3.	**Buildings**					
3.1	Improved Building Codes**	High	High	Cost Savings/ Low Cost	Potential to also yield water savings, comfort/air quality improvements. Code changes advanced in some localities, beginning in others.	
3.2	Promotion and Incentives for Improved Design and Construction (e.g. LEED, green buildings) **	High	Medium/ High	Cost Savings/ Low Cost	Potential overlap with previous option. Also overlap with technology-specific options, and other building-related options. Co-benefits as above, plus urban design, market transformation, and other benefits.	Ranked High priority due, in part, to its role as complementary approach to building codes, which set a compulsory minimum, whereas LEED-type activities are voluntary.
3.3	Training and Education Programs and Certification for Building Planners, Builders/Contractors, Energy Managers and Operators, and Local Officials**	Medium/ High	Medium	Cost Savings/ Low Cost		Some overlap with previous options in Buildings category, and also highly complementary to those options.
3.4	Increased use of blended cement (substituting fly ash or other pozzolans for clinker reduces CO_2 emissions)	Low	Low/ Medium	Cost Savings/ Low Cost	May provide modest avoided waste disposal co-benefit, depending on standard practice	
3.5	Reduction of Emissions from Diesel Engines used in New Construction Developments	Low	Low	Low Cost		Ranked low since there are practical issues associated with providing sufficient sets of temporary switchgear at the times and places they are needed to serve a significant portion of an extremely active building market with grid electricity.

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4.	**Education and Outreach**					
4.1	Consumer education programs**	Medium/ High	Uncertain	Cost Savings/ Low Cost	Potential contribution difficult to estimate	
4.2	Introduce in School Curriculum**	Medium/ High	Uncertain	Cost Savings/ Low Cost	Potential contribution difficult to estimate	Ranked Medium/High because this option is recognized as an important effort with results that will accrue over the longer-term.
5.	**Pricing and Purchasing**					
5.1	Green Power Purchasing Offers to Consumers beyond Green Power Included in Utility RPS**	Low	?	Medium/ High Cost	Interaction with RPS option	Low priority since utility adherence to an RPS of green power purchase (EG expanded EPS) considered more effective than voluntary offers to consumers. AG suggested that the priority should be reconsidered.
5.2	Bulk Purchasing Programs for Energy Efficiency or other Equipment (Public or Private sector)	Low	Low/ Medium	Cost Savings/ Low Cost	May interact with utility programs.	

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6.	**Customer-sited Distributed Generation and Renewable Energy**					
6.1	Distributed Generation	High?	Uncertain (CCS guess: Medium)	Uncertain (CCS guess: Medium Cost)	Utility system benefits. Interaction with TOU rates, net metering options	Note interaction with electricity pricing policies, interconnection rules.
6.2	Clean Combined Heat and Power [Note from CCS--TWG may also want to include here or elsewhere combined heating, cooling and power here, as well as power generation from waste heat]	High	High	Cost Savings – Medium Cost	Cost dependent on price of natural gas; interconnection an issue; utility system co-benefits. .	Note interaction with electricity pricing policies, interconnection rules.
6.3	Renewable Energy Applications (Solar photovoltaic power, solar roofs, solar water heaters, etc.)**	Medium (AG ranked High)	High	Medium/ High Cost	Programs could help to lower capital and installation costs.	Ranked by TWG as Medium Priority because incentive and other programs are already underway at utility, state levels.
6.4	Electricity Pricing: Net Metering, Tariffs/ Time of Use (TOU) Rates**	Medium/ High (AG ranked net metering High)	Medium	Cost Savings/ Low Cost	Potential changes in emissions set at medium level, but note that achieving M level of reductions may take time	Significant utility system co-benefits (transmission and distribution system). Medium/High priority since it will have substantial impact on uptake of both renewable energy technologies (solar PV) and combined heat and power. Tariffs and net metering policies complementary
6.5	Interconnection Rules	High	Uncertain	Uncertain		Complementary with Pricing option, required condition for widespread distributed generation, CHP, renewables generation development

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7.	**Technology Specific Policies**					
7.1	Appliance Recycling/Pick-Up Programs**	Low	Low	Cost Savings/ Low Cost	Long-term impact uncertain	
7.2	White Roofs, Rooftop Gardens, and Landscaping (including Shade Tree Programs)**	Medium	Medium/ High	Cost Savings/ Low Cost	Results likely to vary substantially with design. If widely implemented may have favorable impact on local climate, for example, nighttime temperatures.	Medium priority because implementation may be difficult. Likely to interact with building options such as LEED (option 3.2). AG suggested coverage under Buildings.
7.3	Focus on Specific End-uses/technologies: window AC units, lighting, water heating, plug loads, networked PC management, power supplies, motors, pumps, boilers, etc). Consumer products programs, may include incentives, retailer training, marketing and promotion, education, etc **	To Be Covered in Other Options	(By option, range from Low to High)	Cost Savings/ Low Cost	Interaction with appliance standards, utility programs.	Many individual technologies here may now be covered under 1.5. Other technologies will be covered under other initiatives listed in section 1.

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8.	**Non-Energy Emissions (HFCs, PFCs, SF6, CO2 process Emissions**					
8.1	Participation in Voluntary Industry-Government Partnerships**	Medium/ High	Uncertain	Cost Savings/ Low Cost		Discussions are ongoing between government and industry, but maintaining momentum of discussions should be a high priority
8.2	Promotion of and Incentives for Emissions reduction of CO_2 and Other GHGs used in Industrial Processes	High	Uncertain	Uncertain	Impact, cost likely highly industry, process-specific.	Could include leak reduction/capture, recovery and recycling of process gases. Could also include process changes/ optimization, but TWG consensus is clear that government regulation of process changes is highly undesirable
8.3	Use of Alternative Gases (other HFCs, hydrocarbon coolants, etc.)	Medium/ High	Medium/ High	Low/ Medium Cost		
8.4	Cement Industry: use of Alternative Fuels and improved efficiencies	Low/ Medium	Uncertain	Low/ Medium Cost		Conversations with plant officials have indicated that at least one of the two cement mills operating in AZ has already taken significant steps to increase efficiency and curb GHG and other emissions.

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9.	**GHG Emissions-Specific Goals and Policies**					
9.1	Support for demand-side fuel switching to lower-carbon fuels (industries and consumers)	High	Medium/ High	Cost Savings – Medium Cost	Cost dependent on relative fuel prices Long-term natural gas supply concerns should be considered	Examples include:switching from electric to gas water heating; switching from coal and oil to natural gas in industrial applications; switching from fossil to biomass fuels
9.2 (and 9.3)	Industry-Specific Emissions Cap and Trade Programs and/or Voluntary emissions targets	High	Medium/ High	Low/ Medium Cost	Highly dependent on specification of trading systems	Size of the market (and thus possible linkage to other regions) needs to be considered May interact with other pollution regulations (e.g. ozone standards attainment)
9.4	Negotiated Emissions or Energy Savings Agreements	Low	Uncertain	Uncertain		
10.	**Other**					
10.1	Government Agency Requirements and Goals (including procurement)** - Incorporated with State Energy Goals (1.3)	N/A	Uncertain	Cost Savings/ Low Cost		
10.2	Focus on specific market segments: existing homes (weatherization), new construction, apartments, low income, etc.**	Low	Medium/ High	Cost Savings/ Low Cost	Can be considered as elements of other options in groups 1-3 above	
10.3	Reinvestment Fund**	Low	Uncertain	Cost Savings/ Low Cost		
10.4	Municipal Energy Management**	Low	Uncertain	Uncertain		
10.5	Focus on Small and Medium Enterprises (SMEs)**	Low	Uncertain	Uncertain		
10.6	Industrial ecology/ by-product synergy	Low	Uncertain	Uncertain		

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11.	**Solid Waste and Wastewater Management**					
11.1	Solid Waste Source Reduction	TBD	Medium/ High	Uncertain		
11.2	Solid Waste Recycling	TBD	High	Uncertain	Materials recovery, reduction of energy requirements for raw materials production	
11.3	Separation and Composting of Organic Materials in Solid Wastes	TBD	Uncertain	Uncertain	Co-production of soil amendments	
11.4	Capture/Use in buildings or industry of Methane from Landfills	TBD	Uncertain	Uncertain	Fossil fuel displacement a co-benefit	
11.5	Capture/Use of Methane from Wastewater Treatment	TBD	Uncertain	Uncertain	Fossil fuel displacement a co-benefit	